altogether its identity with cholera, and assert that it is to be found in the mouth of every healthy person. Whatever the specific germ may be, it is at least doubtful whether any filtration will intercept it; from the experience obtained at Valencia and Saragossa it appears evident that neither sand nor charcoal will do so.

In a paper read recently at the Institute of Civil Engineers, Dr. Percy Frankland asserts that the London Water Companies do, at the present moment, eliminate 96 per cent. of all the micro-organisms in the Thames water by simple filtration through 3 feet of fine sand. This may be so, but it is equally certain that filtration through sand, even at a very slow speed indeed, will not eliminate the minute particles suspended in waters of a deltaic character, and which gives such waters their peculiar colour. If sand is incapable of intercepting these particles, it may also be incapable of intercepting the specific germs or poison that produce cholera in the human body.

Filtration is, at the best, but a doubtful proceeding for the purification of water. It is impossible to control effectually the speed of the filters; they vary at every moment, and although a mean term may be arrived at by taking the area of the filter-beds and the volume of water filtered in the twenty-four hours, yet this really affords no reliable guide as to the actual speed at which the water has passed the filters. It is probable—nay, almost certain—that, out of a given quantity of water, no two gallons have passed at the same speed, and it is possible and probable that one-half of the total volume may have passed the filter at double or treble the speed of the rest.

To insure immunity from contamination, the only real and practical method appears to be that of capturing the water at a pure source and conducting and delivering it in such a way as to render it impossible that any specific germ or poison should have obtained access to it. In the matter of cholera, for instance, with the experience of Valencia and Saragossa before us, one cannot feel any confidence in water which is taken from a river liable to so many sources of contamination as is the Thames, and it is at least doubtful whether any system of filtration would be capable of eliminating cholera-poison from such waters. It is extremely probable that simple filtration through sand will not do it.

The very interesting series of letters published by the *Times* on the subject of cholera in Spain afford much valuable data as to the causes of the disease, or rather as to its mode of propagation. It is unfortunate that the writer seems to have gone out with a preconceived idea that the cause of the propagation of cholera was defective drainage, and consequently to have devoted the greater part of his time to the examination of the sewerage of the various towns he visited, and of their general sanitary arrangements, the water-supply being as a rule relegated to the second place. He appears to be a strong advocate for traps, and not to be aware that the best sanitary authorities of the present day are beginning to doubt very strongly the utility of traps, and to rest their practice rather on the thorough ventilation of sewers, the rapid discharge of their contents, and a complete disconnection between the house drainage and the main sewers.

It is not too late for some scientific investigator to go over the track of the cholera invasion in Spain, to trace the progress of the disease in the towns it visited, and ascertain all the facts connected with their drainage and water-supply, and also, what is not less important, examine the conditions of those towns which so far have enjoyed a practical immunity from the epidemic. As much is to be learned from this negative evidence as from the other.

Pending the discovery by scientific men as to the particular germ or poison that creates cholera, such a practical examination as I suggest would be of immense value to us, by teaching how the propagation of the disease is principally brought about, and what are the best means of preventing it.

GEORGE HIGGIN

NOTES

THE Royal Society *conversazione*, on June 9, was in all respects satisfactory. We can only afford to refer briefly to a few of the exhibits which attracted the interest of the numerous visitors, who were received by Professor and Mrs. Stokes. A room was devoted to telephones connected with the Savoy Theatre, and the company were delighted to hear the Mikado under such novel conditions. The models of the Romano-British village near Rushmore, on the borders of Dorset and Wilts, between Salisbury and Blandford, exhibited by Lieut.-Gen. A. Pitt-Rivers, F.R.S., attracted much attention. The rare earths from samarskite, gadolinite, &c., with illustrations of their phosphorescent spectra, exhibited by Mr. W. Crookes, F.R.S., were magnificent. The pumice, volcanic ash, drawings, diagrams, &c., illustrative of the effects produced by the great eruption of the island of Krakatão, Java, in August 1883, exhibited by the Krakatão Committee of the Royal Society, proved very attractive, as did the fine collection of astronomical photographs exhibited by Mr. Common, Dr. Gill, the Solar Physics Committee, and others. At 9.30 and 10.30 the stellar and solar photographs were demonstrated, and at 10 Mr. Common demonstrated the photographs of nebulæ and comets. The first series included the stellar photographs recently taken by the Brothers Henry at the Paris Observatory. The remaining photographs had reference to solar phenomena, and consisted of two series, one from Meudon, the other from Kensington; the former, contributed by Dr. Janssen, had reference to the minute portion of the solar surface; the latter, to some recent attempts to photograph the spectra of sunspots and prominences. The photographs of planets, comets, and nebulæ, exhibited by Mr. A. A. Common, F.R.S., consisted of (1) series of photographs of Saturn; (2) series of photographs of Jupiter; (3) photograph of Mars; (4) nucleus of the great comet 1882; (5) the Dumb-bell Nebula; (6) the Crab Nebula; (7) the Spiral Nebula; (8) the Great Nebula in Andromeda; (9) series of photographs of the Great Nebula in Orion, with exposures of 1 min. to 80 min. (the above were all taken with the 3-foot reflector at Ealing); (10) recent photographs of Saturn, Jupiter, and the nebulæ in the Pleiades, by the Brothers Henry.

AT the annual meeting of the American Academy on May 25, it was voted to present the Rumford gold and silver medal to Prof. Langley, of the Alleghany Observatory, for his researches on radiant energy.

THE thirteenth annual meeting of Scandinavian naturalists will take place in Christiania between July 7 and 12.

WHILE Mount Etna has again quieted down during the past week, volcanic energy has manifested itself at the Antipodes in an unexpected quarter. Though the North Island of New Zealand is known to be greatly volcanic, and has in Tongariro an active volcano, there has been no destructive eruption within the memory of man. The eruption therefore telegraphed on June 10 was quite unexpected. It occurred in the Tarawera district, on the east side of the Tarawera Lake, lying in a line between the Bay of Plenty and the mouth of the Wanganui River. It is a long way north from Tongariro, and in the midst of the wonderland of Rotomahana's hot springs and many-coloured terraces. The country is stated to be in a disturbed state for many miles around, and it is estimated that a hundred natives and ten Europeans have perished.

A SHOCK of earthquake was felt on Friday night at Sandy Hook and Coney Island, New York, U.S.

AN earthquake was felt at Bougie, Algeria, on June 10; no accidents are recorded. On the same day a heavy thunderstorm raged in the vicinity of Versailles. The lightning struck a tent at Sautenay camp; sixty soldiers were lying under it; many were hurt, but none killed.

ARRANGEMENTS are in progress for the establishment of an aquarium and winter-garden in Stockholm.

DURING the present summer a university will be opened at Tomsk, in Siberia, the first of its kind in this part of the Russian Empire. At first it will consist of two faculties—a historical-philological one and a physical-mathematic. It already possesses a library with 50,000 books, a very valuable palæontological collection, presented by Duke Nicolaus of Leuchtenberg.

EARLY last year the East Indian section of the Dutch Royal Institution of Engineers published some prize questions for essays. One of these subjects was the theoretical methods and calculations used when making deductions from observations on earthquakes, together with positive data as to the situation of the point of egress of a given shock. The first prize of 150 guilders and a diploma was awarded to Prof. Milne of Japan. He also received honourable mention for an essay on another question respecting the application of the theoretical principles of seismological science to the art of house-building, especially in the Netherlands Indies, the prize committee at the same time asking for permission to use his observations and suggestions in a work under preparation by one of the members of the committee, who has studied Javanese seismological phenomena and Javanese methods of architecture.

IN a paper in the last number of the *Journal* of the American Oriental Society Dr. Martin, the head of the Foreign College at Pekin, writes on the "Northern Barbarians" of Ancient China, or the tribes which harassed the northern frontier. The ethnology of these and other tribes inhabiting China and the adjacent regions is at present engaging much attention from Oriental scholars, and especially in England that of Prof. de Lacouperie. Dr. Martin confesses that we are still in darkness respecting the ethnology of these northern tribes. Even in regard to the great tribe of Hiongnu, which is conspicuous in history for many centuries about the commencement of the Christian era, it has been much disputed whether they were Turks, Huns, or Mongols. Dr. Martin thinks that these tribes of prehistoric times were probably not inferior to the Chinese in form, feature, or natural intelligence, as their descendants, the Manchus and Mongols, are not inferior in any of these respects. In reply to the question were they originally of one mould, or have the lines of distinction become gradually effaced by the intercourse of ages, he thinks the latter the correct hypothesis. He believes that the primitive Chinese type, that imported by the immigrants who founded the civilisation of China, is no longer to be discerned. In the southern and central regions it has everywhere been modified by combination with the aboriginal inhabitants, leading to provincial characteristics, which the practised eye can easily recognise. It has probably undergone a similar modification in the northern belt, where it met with tribes akin to those of Mongolia, and gradually absorbed them. This process was going on in prehistoric times; history at its earliest dawn shows us the unassimilated fragments of these tribes, and at the same time discloses a vast movement southward all along the line. In the historic period these tribes, organised into great states, established in China a dominion enduring for centuries. They have, Dr. Martin thinks, stamped their impress on the people of this region as thoroughly as the Saxons have theirs on the people of England, or the Vandals theirs in that part of Spain which still bears their name in the form of Andalusia. In their turn the invaders have been subjected, in all ages, to influences under which they exchanged barbarism for such civilisation as they found among the more cultivated race.

THE assertion that from the top of the Eichel tower communication could be established with Dijon, a place situated 304 kilometres from Paris, is not quite correct. The altitude of this proposed monument being only 300 metres, the radius of the horizon could not exceed 80 kilometres, if we disregard the inequalities of the surface. But the mountains which separate the basin of the Seine and that of the Rhone, which are in Côte d'Or, although not very lofty, may possibly be perceived from an elevation of 300 metres at Paris, under the most favourable circumstances, and they are not very far from Dijon. Practically such a tower could be used for placing Paris in communication with any army occupying these mountains. These facts are sufficiently proved by the success of the great triangulation executed by Col. Perrier between the province of Oran and the Sierra Nevada at a distance of over 200 kilometres. The question is, if it is possible to erect this structure, whether it is worth the money required to build it, and whether the effect will not be to destroy all harmony in the great Exhibition. This question is not settled yet.

WITH reference to Mr. Caldwell's observations in which he found that Monotremes are oviparous with mesoblastic ovum, a correspondent sends us the following quotation from a work by Robert and Thomas Swinburn Carr, entitled "The Literary Pancratium," foot-note on p. 8 (London, 1832):—"But this is New Holland, where it is summer with us when it is winter in Europe, and *vice versâ;* where the barometer rises before bad weather, and falls before good; where the north is the hot wind, and the south the cold; where the humblest house is fitted up with cedar; where the fields are fenced with mahogany, and myrtle-trees are burnt for fire-wood; where the *swans are black* and the eagles white; where the kangaroo, an animal between the squirrel and the deer, has five claws on its fore-paws, and three talons on its hind-legs, like a bird, and yet hops on its tail; where the mole lays eggs, and has a duck's bill; where there is a bird with a broom in its mouth instead of a tongue; where there is a fish one half belonging to the genus *Raja* and the other to that of *Squalus;* where the pears are made of wood, with the stalk at the broader end; and where the cherry grows with the stone on the outside.—Field's *New South Wales,* p. 461."

JUST as improved machinery, adopted in a locality to which the old trade was a stranger, through not being there hampered with old customs and much invested capital, may bring with it the future trade, so an intelligent and rapidly-progressing nation like Japan, by the free choice of the latest improvements in educational organisation from both Europe and America, may even have something to teach. Hence the United States Bureau of Education has lately published a circular containing a statistical survey of the system now adopted there. There is a Minister of Education over all; candidates for school committees are nominated by each locality—either a large city or a province—into which the country is divided; a selection is made from them by the Governor, and the chosen members are paid. There are schools of general education divided into three grades, to pass through all of which occupies eight years. The study of literature gives the choice of either Japanese or Chinese, the former requiring three years, the latter four. English, or if preferred, French or German, is required to be learnt in all middle-class schools, as well as in the highest. At the one University a course of instruction in the department of science is provided in mathematics, physics, chemistry, biology, astronomy, engineering, geology, mining, and metallurgy. There are astronomical and meteorological observatories, botanical gardens, and museums. Courses are provided in medicine, leading up to a special degree after a course of five years, and in pharmacy after a course of three. Independent of the University are the Military Academy and the Engineering College, the last two out of the six years' course of the latter being spent in practical applications. Technical education is divided into chemical and mechanical. There are higher schools in the country for nearly every special purpose; but with all this carefully-proportioned system the titles and objects of thirty societies show how thoroughly the English system of voluntary association is making its way as a method of supply to educational demand.

ON presenting to the St. Petersburg Academy of Sciences his new researches into the language of his "Codex Comanicus," published by Count Kunn, Prof. Radloff made a few remarks well worthy of attention (*Bulletin*, vol. xxxi. No. 1). After having carefully catalogued all words appearing in the "Codex," Prof. Radloff has collected, under each separate word, the words akin to it in different Turkish dialets, so as to show their kinship at once. It appears that the Comanic dialect belongs to the great group of Turkish dialects which M. Radloff describes as the Kypchak group; the parent language having been spoken from the ninth to the thirteenth centuries by those Tartars who inhabited the Steppes from the Altai Mountains to the Black Sea. They now comprise the Abakan Tartars, the Barabintsys, the Irtysh and Kazan Tartars, and the Kirghizes. The "Codex" thus offers a sample of the oldest language spoken by the Kypchak stem. After having concluded his researches into this dialect, Prof. Radloff will devote his attention to the Uigur languages, for which we have so rich a material; and then he will take up the third group of the Seldjuck languages. Only after such an inquiry, he says, may we hope to attain a thorough knowledge of the whole of the Turkish languages, because all the newer material, and much of the older, belongs to the artificial written languages. The Osman and the Jagatai (or East Turkish) dialects are not representatives of defined groups of dialects, but artificial languages based, the latter on the Uigur language, and the former on the Seljuk, with a mixture of different other dialects. As to the Kazan written language, it is a most varied mixture, in which Osman are mingled with Djagatai forms, while the people are acquainted with neither of them.

WE have received the *Proceedings* of the Windsor and Eton Scientific Society for the past year. It contains reports of a few lectures on general scientific subjects. We do not see any evidence of that local scientific work for which these societies are so remarkable, and which is the most beneficial outcome of their activity. Still, the President, who must be a good judge, in his address for the year states that the Society is steadily but surely making its mark as one of the many aids to intellectual improvement which are offered to the people of Windsor and the neighbourhood by the Albert Institute and the various societies associated with it.

COMMENT was made in this journal on a recent date respecting the enemies of frogs. Mr. W. August Carter, of the Fisheries Section of the Colonial and Indian Exhibition, has made further observations upon the subject, and finds that the tortoise must be added to the list of foes. With a view of substantiating this fact Mr. Carter placed some medium-sized frogs with several tortoises of the same dimensions, when the latter immediately attacked them ferociously, and held them firmly by the legs, notwithstanding their efforts to escape. The tortoises were, however, unable to devour more than a portion of the leg, which they did with much apparent difficulty, the frogs afterwards escaping, but only to be recaptured and similarly treated. Considering the tortoises measured only 1¼ inches in length, they displayed remarkable courage, whilst their agility was certainly greater than that usually displayed by these members of the Chelonian family.

A VERY large specimen of the Ascension turtle died at the Colonial and Indian Aquarium last week. It was the only one of this species on view, and had been the object of considerable notice on account of its colossal proportions. As a further proof of the tenacity of life amongst turtles, it may be remarked that this particular specimen had existed more than two months without food. At its death 100 eggs were found in it, the retention of which doubtless proved fatal to the turtle.

THE additions to the Zoological Society's Gardens during the past week include an Ourang-Outang (*Simia satyrus* ♀) from Borneo, presented by Mr. H. H. Riccard; a White-handed Gibbon (*Hylobates lar*) from the Malay Peninsula, a Binturong (*Arctictis binturong* ♂), a White-whiskered Paradoxure (*Paradoxurus leucomystax*) from Malacca, presented by Mr. Dudley Hervey; a Binturong (*Arctictis binturong*) from Malacca, presented by Capt. Robert Hay; a Common Genet (*Genetta vulgaris*), South European, presented by Mr. J. Church Dixon; a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Miss Grace Balfour; a Green Monkey (*Cercopithecus callitrichus* ♂) from West Africa, presented by Mr. Duncan Armstrong; an Indian Civet (*Viverricula malaccensis* ♂) from India, presented by Capt. Archibald Douglas, R.N.; a Herring Gull (*Larus argentatus*), British, presented by Mr. C. A. Marriott; two Black-billed Tree Ducks (*Dendrocygna arborea*), a Violaceous Night Heron (*Nycticorax violaceus*), a Brazilian Cormorant (*Phalacrocorax brasilianus*), a Fugitive Snake (*Dromicus fugitivus*) from the Bahamas, presented by Mrs. E. Blake; two Mexican Guans (*Penelope purpurascens*) from Mexico, presented by Mr. E. A. Clowes; a Garden's Night Heron (*Nycticorax gardeni*) from St. Kitts, West Indies, presented by Dr. A. Boon, F.R.C.S.; seven Common Vipers (*Vipera berus*), from Hampshire, presented by Mr. Walter Blaker; four Three-toed Sand Skinks (*Seps tridactylus*), South European, presented by Mr. J. C. Warbury; a Puma (*Felis concolor*) from South America, a White-handed Gibbon (*Hylobates lar*) from the Malay Peninsula, ten Adorned Ceratophrys (*Ceratophrys ornata*) from Buenos Ayres, deposited; two Viscachas (*Lagostomus trichodactylus* ♀ ♀), two Crossed Vipers (*Craspedocephalus alternatus*) from Buenos Ayres, a South American Flamingo (*Phœnicopterus ignipalliatus*), a Roseate Spoonbill (*Platalea ajaja*) from South America, a Harnessed Antelope (*Tragelaphus scriptus*), two Balearic Cranes (*Balearica pavonina*) from West Africa, two Lineated Kaleeges (*Euplocamus lineatus* ♂ ♀) from Tenasserim, a Porose Crocodile (*Crocodilus porosus*) from Ceylon, a Bald Ouakari (*Brachyurus calvus* ♂) from Brazil, purchased; a Burrhel Wild Sheep (*Ovis burrhel*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE MELBOURNE OBSERVATORY.—We have received Mr. Ellery's Report, dated October 6, 1885, which refers to the year ending the previous June 30. The great reflector, after some slight repairs, readjustments, &c., is stated to be in excellent working order. The work done with this instrument has been chiefly confined to a revision of southern nebulæ, already observed by former observers, preliminary to publication. One hundred and seventy-two nebulæ have been re-observed and re-drawn to compare with the plates to be published. Many of these nebulæ have been observed twice, and some three times, and none were completed until they had been observed on a first-class night. The new transit-circle with object-glass of 8 inches aperture, constructed by Messrs. Troughton and Simms, has been in continuous use for all the meridian work of the Observatory since August 22, 1884, and has proved very satisfactory in every respect. The number of right ascension observations obtained with this instrument since its erection was 2287, and the number of declination observations 983, comprising observations of a list of stars selected by Dr. Auwers for reduction of zone and Transit of Venus observations, stars observed with comets, and stars selected from the Melbourne zones. All the individual observations are completely